

Environmental Health

Background:

Environmental health is a varied field that links environmental conditions with human health effects. Its scope is large and covers a range of topics that includes bedbugs and high-level radioactive waste. At its core, it strives to promote health and prevent or minimize exposures that may have adverse health effects. It encompasses the air we breathe, the food we eat, and the places where we live, play and work.

An intricate system of national and state laws and rules formally regulate some of the work such as drinking water, septic systems, food safety, public pools and spas, camps, hotels, motels, school kitchens, tattooing and others. These programs include the very foundations on which public health has been built — the provision of safe drinking water and the proper disposal of human waste. In Maine, these programs have existed for nearly 100 years.

Environmental health performs other necessary functions. It provides the public with credible science-based data that helps them to make decisions that can affect the quality of their own lives. It guides people to take simple actions that can be life-saving, such as installing carbon monoxide monitors outside of bedroom doors, or measuring the radon levels in their home.

Maine people face specific environmental challenges resulting from our physical position on the globe, from our geology, and from many other factors. Maine houses are old and contain lead paint that can harm children and adults. Geographically, Maine is situated at the end of nation's tailpipe which means that prevailing winds carry other states' air pollution here and that adversely affects our air quality. Some parts of the state are underlain with thick mineral-laden bedrock which can contribute harmful levels of arsenic, uranium and radon to unaware private well owners. Fortunately, systems are in place that can help Mainers cope with these issues.

Health Equity Highlight: Lead Poisoning in Low Socio-Economic Status Populations

Childhood Lead Poisoning in Maine is associated predominantly with dust from lead paint found in homes built before 1950.¹ Approximately 100 children under age 6 years are poisoned by lead each year in Maine.²

Certain populations are at high risk for lead poisoning:

- Four out of five (84%) children identified with lead poisoning in 2011 were also MaineCare recipients.³
- The childhood lead poisoning rate in the Lewiston-Auburn area is 2.9% nearly three times more than the state average rate of 1%.³
- Half (50%) of all children identified with lead poisoning in Lewiston in 2011 were of African descent.³
- The Somali and Somali Bantu populations in the Lewiston-Auburn area appear to be at higher risk.³

The Public Health Response:

An important part of environmental health is responding to on-going or emergency man-made or natural threats such as food or waterborne disease outbreaks, floods or ice-storms; even the earthquake, tsunami and nuclear power plant damage that occurred in 2011 half-way across the world in Japan and whose effects were closely monitored here in Maine.

The public has a strong expectation that the activities they enjoy or participate in are safe — and that some entity is responsible for insuring their safety. To this end, significant progress has been made in helping Maine people enjoy safe and healthy lives by reducing risks in the environment. Proper planning and sufficient surge capacity are crucial to the state's ability to handle sudden, unexpected environmental health emergencies.

At the same time, chronic exposures, like trace drinking water contaminants, lead paint and radon, require ongoing, sustained, incremental efforts.

The public health response, however, requires understanding environmental health-related conditions. This requires strong surveillance and reporting systems that include integrated state, regional, and local components. Information gathered in these reporting systems will help us to look for associations between the environment and disease and allow us to target our prevention programs to continue to minimize the contributions of environmental risk factors for disease.

Healthy Maine 2020 Objectives

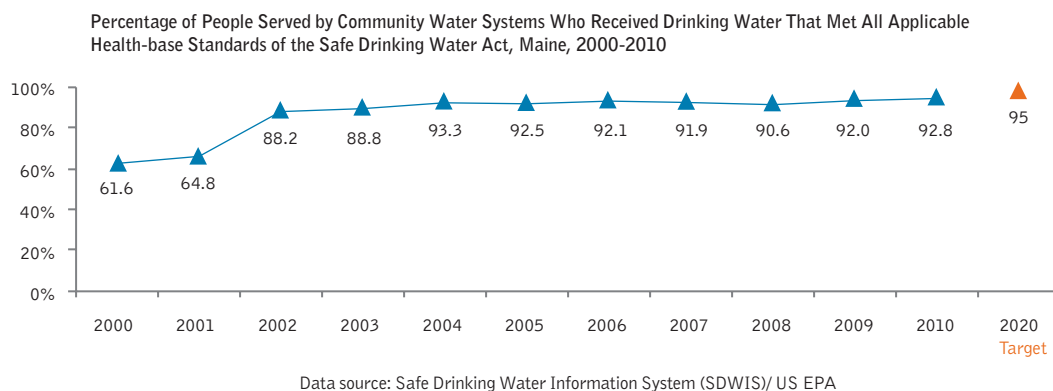
1. Increase the proportion of persons served by community water systems who receive a supply of drinking water that meets the requirements of the Safe Drinking Water Act

This indicator illustrates how successful public water systems are at meeting the health-based standards of the Safe Drinking Water Act. Safe

drinking water is critical to reducing exposure to infectious agents and toxic chemicals, both naturally occurring and those introduced by human activities, including hydrocarbon use, agronomic activities, and waste disposal.

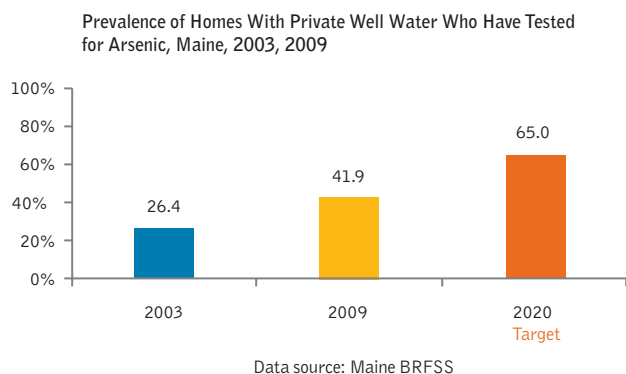
Maine's public water systems have very good rates of compliance with water quality standards; but according to the U.S. EPA, these systems will need \$900 million in infrastructure maintenance and improvements over the next 20 years to maintain quality and service,⁴ illustrating the need to continue to track the success of water systems in meeting water quality standards.

Since 2000, an increasing number of Maine people served by public water systems have been receiving water that meets all applicable health based standards, although the rate of change has been slow in the past 6 years (it has been around 92%; the Healthy Maine goal is 95%).



2. Increase proportion of homes with private wells tested, and, where necessary, treated for arsenic

Of all the 50 states, Maine has the highest per capita reliance on private wells for drinking water (44%), based on census figures. Over half of Maine's population relies on private well water as their primary source of drinking water. In Maine, public and private testing data indicate that 10% of private wells have unsafe amounts of arsenic, 5% have unsafe levels of uranium and as much as a third may have high levels of radon.⁶ Arsenic and radon are known human carcinogens. Arsenic may also cause adverse effects on the developing brain, including IQ deficits.



Uranium is both a cancer causing substance and has kidney toxicity.⁵ Therefore, it is important to track changes in water testing practices, and arsenic testing in particular was selected for this measure due to combination of high prevalence in Maine well water and the greater possibility for adverse health effects.

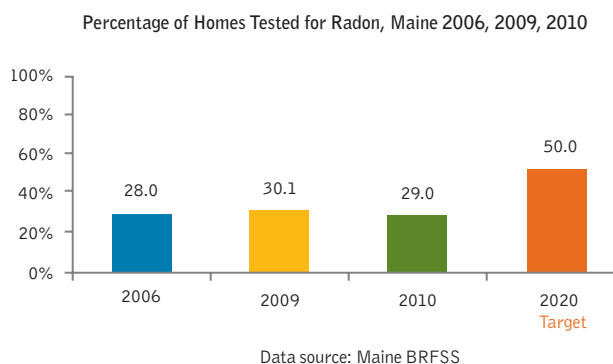
The percent of homes in Maine with private well water that are tested for arsenic has increased from 26.4% (2003) to 41.9% (2009); the Healthy Maine 2020 goal is to increase that to 65%.

3. Increase the proportion of homes tested for radon

Radon is the second leading cause of lung cancer after active smoking and the leading cause among non-smokers.⁷ Radon causes an estimated 21,000 lung cancer deaths in the U.S. every year.⁸ About 1/3 of all Maine residences have elevated levels of radon.⁹

In 2009, Maine passed legislation that requires testing for the presence of radon in rental buildings by 2012 and every 10 years thereafter.

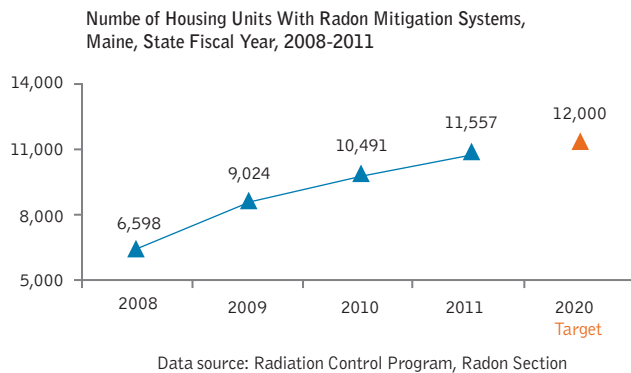
The percent of Maine homes that have been tested indoor air for radon has not changed since 2006,



when it was 28%. The Healthy Maine 2020 goal is 50%.

4. Increase the number of homes with an operating radon mitigation system for persons living in homes at risk for radon exposure

Maine has many buildings with elevated radon, with previous studies showing an average of 1/3 of buildings statewide having elevated radon. Some areas in Maine have elevated radon in up to 2/3 of buildings.¹⁰ Mitigation systems can reduce radon to levels well below the level of concern.



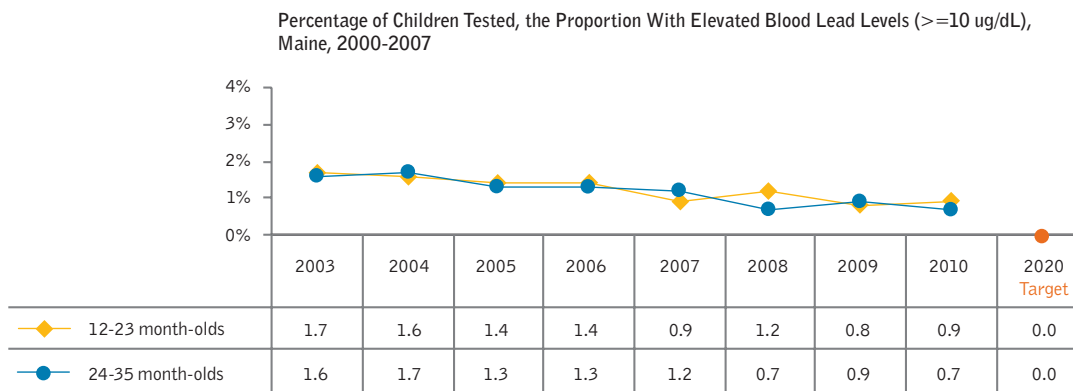
In 2009 there were 11,557 Maine housing units with radon mitigation systems; the Healthy Maine 2020 goal is 12,000.

5. Reduce the proportion of children with elevated blood lead levels

There is no safe amount of lead exposure for children. Changes in cognitive function related to even low-level lead exposure have been shown to affect school performance, educational attainment, and IQ scores.¹¹ The association between lead

exposure and IQ and future income earnings is well established in the scientific literature.¹² Studies have shown that at current levels of lead exposure, each new cohort of five-year old children in Maine (approximately 13,000 children) will suffer on average a one-point loss in IQ score and as a result can expect to earn as an aggregate \$270 million less over their lifetimes.¹³ Recently the lead standard has been lowered from ≥ 25 ug/dl to ≥ 10 ug/dl, as new information on the dangers of lead has come to light.

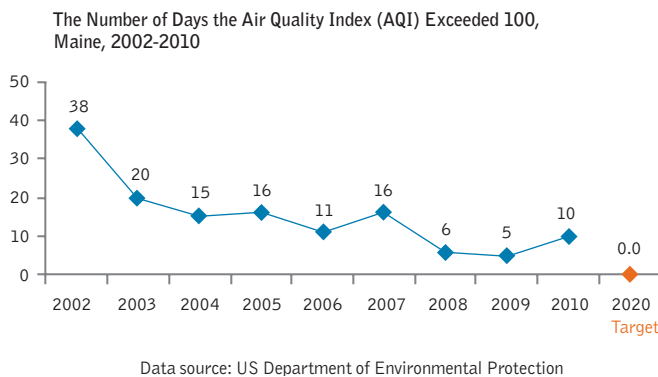
Childhood lead poisoning is completely preventable. In Maine, the proportion of elevated blood levels in children tested has been decreasing significantly over time. In 2003, approximately 1.7% of tested children aged 12-23 months old had elevated blood levels, which dropped to .9% in 2010. In 24-35 month-old children the rate decreased from 1.6% in 2003 to .7% in 2010. The Healthy Maine 2020 goal is 0% for each age group.



Data source: Healthy Homes Lead Poisoning Surveillance System

6. Reduce the number of days the Air Quality Index (AQI) exceeds 100

Due to regional and national efforts to reduce pollution, ozone and particle pollution levels in Maine exceed the AQI level of 100 less often than in the past. Since Maine's pollution levels are largely due to transport of air pollutants, much depends on the weather during any given year. However, pollution levels are not as high as they have been in the past, even during ideal transport conditions.



The Maine Department of Environmental Protection keeps records on the number of days when the AQI is between 50 and 100 (the category of “moderate”), and over 100 (including the categories of “unhealthy for sensitive groups,” “unhealthy,” and “very unhealthy”) based on its air quality monitoring data. This indicator is a measure of the number of days air pollution levels in Maine exceeded the national ambient air quality standards.

In recent years there has been a gradual downward trend in the number of days with poor air quality. In 2010 there were just 10 days in which the AQI exceeded 100, compared to 2002 which experienced 38 such days. The Healthy Maine 2020 goal is 0 days.

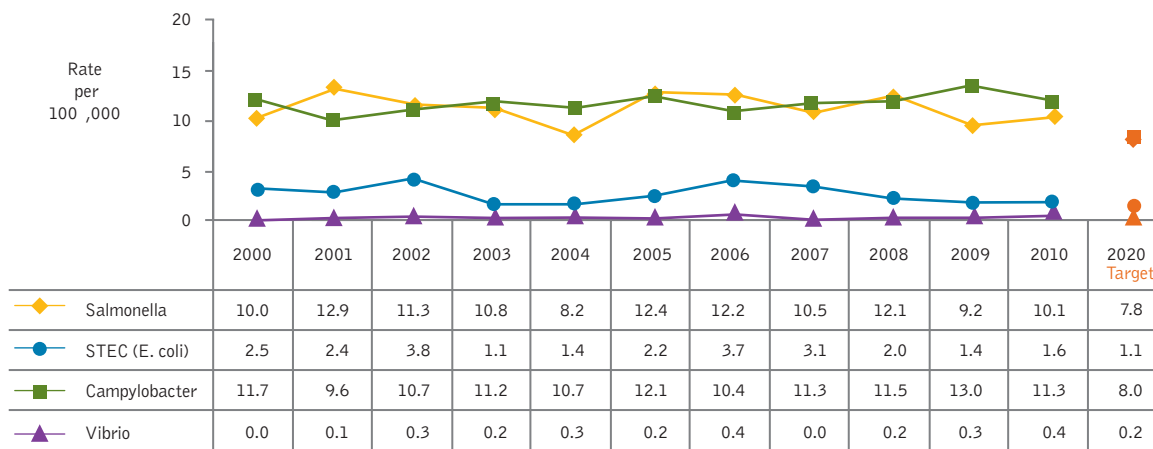
7. Reduce infections caused by key pathogens transmitted commonly through food

In 2011, Maine regulated 6,300 eating establishments and received 100 food-borne illness complaints from the public. Recent rule changes designed to improve food safety requires some eating establishments to retain a Certified Food Protection Manager (CFPM). The US FDA's research has shown that the presence of a CFPM decreases the occurrence of food-borne illness. Food-borne diseases affect tens of millions of people and kill thousands in the United States each year. They also result in billions in healthcare-related and industry-related costs annually.¹⁴

Campylobacter, Shiga toxin-producing E. coli (STEC), Salmonella, and Vibrio are pathogens commonly transmitted through food. Food-borne illnesses can be prevented through proper hand-washing, proper food storage, preparation, service and clean food preparation areas, including those in licensed eating establishments.

Maine CDC maintains systems to track case of gastrointestinal illness that are reported. Salmonella cases have remained relatively constant over the past 10 years. STEC cases have decreased each year, Campylobacter cases continue to increase. In 2010 there were 10.1 cases of salmonella per 100,000 persons, 1.6 cases of STEC per 100,000 persons, 11.3 cases of Campylobacter per 100,000 persons, and 0.4 cases of Vibrio per 100,000 persons; the Healthy Maine 2020 goals are to reduce the rates to 7.8, 1.1, 8.0, and 0.2 per 100,000 persons respectively.

Rate of Infections per 100,000 Population, Caused by Key Pathogens Transmitted Commonly Through Food, by Pathogen, Maine 2000-2010



Source: Behavioral Risk Factor Surveillance System

Methodology notes

1. Increase the proportion of persons served by community water systems who receive a supply of drinking water that meets the requirements of the Safe Drinking Water Act

Measure: Percentage of persons served by community water systems who will receive drinking water that meets all applicable health based standards of the Safe Drinking Water Act.

Numerator: Persons served by community water systems who receive a supply of drinking water that meets all applicable health based standards of the Safe Drinking Water Act.

Denominator: Total population served by community water systems.

Target setting method: Two percentage points improvement, based on past trends.

Other notes: Violation data from the Safe Drinking Water Information System (SDWIS) is used to determine which community water systems are meeting all applicable health based standards. The objective used by HM2020 matches an existing objective used by the US EPA to measure the success of Maine's public water systems. The objective is similar to HP2020. HP2020 uses all standards of the Safe Drinking Water Act while HM2020 and the US EPA use all applicable health based standards of the Safe Drinking Water Act.

2. Increase proportion of homes with private wells tested, and, where necessary, treated for arsenic and other substances of concern

Measure: Percent of homes with private wells tested for arsenic.

Numerator: Number of homes with private well water that have tested for arsenic in their well water.

Denominator: Number of homes with private well water (not limited to homes who have tested their water).

Target setting method: About the same rate of increase observed for last decade (2000 - 2010) – 60% increase.

Other notes: The HP2020 objective is based on reducing arsenic levels as measured in urine. The HM2020 objective is based on increased environmental testing of private well water for arsenic as a means to reduce arsenic exposure, which will have the effect of reducing arsenic urine levels.

3. Increase the proportion of homes tested for radon

Measure: Percent of homes tested for radon.

Numerator: Number of homes who have tested air for radon.

Denominator: Number of households in the BRFSS survey.

Data source: BRFSS. These data have been weighted to the household and not the individual. Therefore, estimates represent 'the percent of households.'

Target setting method: Approximately 40% based on past trends and new legislation that will significantly impact this measure.

Other notes: The Healthy People 2020 measure is focused on the number of homes with high radon levels that have been mitigated (see below). This new HM2020 objective is focused on increasing the percent of homes that have tested the indoor air for the presence of radon.

4. Increase the number of homes with an operating radon mitigation system for persons living in homes at risk for radon exposure

Measure: Number of housing units with radon air mitigation systems.

Numerator: Number of housing units with radon air mitigation systems. (There is no denominator for this measure.)

Data source: Radiation Control Program, Radon Section.

Target setting method: Approximately 4% based on past trends and Maine CDC expert opinion.

Other notes: These data are not weighted. Reported values for mitigations are total radon air mitigations reported between Oct 1, 1993, when reporting began, to the end of the previous state fiscal year. Radon air mitigation reporting is required by 22 MRSA Section 771 et seq. The end of the state fiscal year is being used as the cut-off point because all radon funding is from a federal grant, which requires as one measure of achievement, reporting of mitigations during the grant period which matches the state fiscal year. Data begins in 2008 as this is the first year this data was reported for the Federal radon grant. This is similar to a Healthy People 2020 objective (the amount of radon mitigations systems installed relative to the number of housing units), but uses a different data source. The Maine data source does not have information on the number of homes that have elevated radon levels, and therefore this is presented as a count, not a proportion.

5. Reduce the proportion of children with elevated blood lead levels

SUB-OBJECTIVES:

5a. Reduce the proportion of children ages 12-23 months with elevated blood lead levels

5b. Reduce the proportion of children ages 24-35 months with elevated blood lead levels

Measure: Of those children tested, the proportion with elevated blood lead levels (≥ 10 ug/dL).

Numerators: Children ages 12-23 months, and 24-35 months, with blood lead levels greater or equal to 10ug/dl, defined as the first identification for that child as a case (not including follow up testing).

Denominator: Children ages 12-23 months, and 24-35 months, whose blood has been tested for lead, (first blood lead test in age category).

Target setting method and other notes: This is a HP2020 objective. The target matches a goal set by the Maine legislature in the State's Lead Poisoning Control Act (22 MRSA §1314-A).

6. Reduce the number of days the Air Quality Index (AQI) exceeds 100

Measure: Number of days the Air Quality Index (AQI) exceeds 100.

Numerator: Number of days the Air Quality Index (AQI) exceeds 100. (There is no denominator for this measure.)

Target setting method and other notes: This is a HP 2020 objective. The target was set based on the regulatory goal of the Clean Air Act (i.e., attainment of the air quality standards) along with the downward trends in Maine over recent years.

7. Reduce infections caused by key pathogens transmitted commonly through food

SUB-OBJECTIVES:

7a. Reduce infections caused by Salmonella.

Measure: Rate of Salmonella cases per 100,000 population.

7b. Reduce Infections caused by shiga toxin-producing E. coli (STEC).

Measure: Rate of STEC cases per 100,000 population.

7c. Reduce infections caused by Campylobacter species.

Measure: Rate of Campylobacter cases per 100,000 population.

7d. Reduce infections caused by Vibrio species.

Measure: Rate of Vibrio cases per 100,000 population.

Numerators for all: Number of probable and confirmed cases.

Denominator for all: Estimate of Maine population for each year calculated.

Data Source for all: National Electronic Disease Surveillance System (NEDSS) Based System (NBS)

All positive laboratory reports are required by law to be reportable to Maine CDC. All reported cases are investigated and classified based on CDC/CSTE case definitions.

Target setting method and other notes: This is a Healthy people 2020 objective, and the targets are the same as for HP2020:

- 7a. 25% improvement (based on 3 year average, 2008-2010)
- 7b. 50% improvement (based on 3 year average, 2008-2010)
- 7c. 33% improvement (based on 3 year average, 2008-2010)
- 7d. 25% improvement (based on 3 year average, 2008-2010)

References

1. Maine Childhood Lead Poisoning Prevention Program, *Childhood Lead Poisoning in Maine 2008 Surveillance Report. Environmental and Occupational Health Program*. 2008, Maine Center for Disease Control and Prevention.
2. Maine Childhood Lead Poisoning Prevention Program, *Childhood Lead Poisoning in Maine 2010 Surveillance Report. Environmental and Occupational Health Program*. 2011, Maine Center for Disease Control and Prevention.
3. Maine Tracking Network, Environmental and Occupational Health Program. *The Maine Tracking Network: Improving Public Health with Better Information*. 2012 [cited 2012 January 18]; Available from: tracking.publichealth.maine.gov
4. US Environmental Protection Agency, Drinking Water Infrastructure Need Survey and Assessment, Third Report to Congress, June 2005 [cited February 22, 2012] available from: epa.gov/ogwdw/needssurvey/pdfs/2003/report_needssurvey_2003.pdf
5. Maine Center for Disease Control and Prevention, *Unregulated contaminants grant pre-approval application*. 2011.
6. Maine CDC Radiation Control Program, unpublished data.
7. World Health Organization, *Handbook on Indoor Radon: A Public Health Perspective*. 2009.
8. U.S. Environmental Protection Agency. *EPA Assessment of Risks from Radon in Homes*. 2003 [cited 2011 December 16]; Available from: epa.gov/rpdweb00/docs/assessment/402-r-03-003.pdf
9. Environmental Protection Agency, *State Indoor Radon Survey- Maine Chapter*. 1989.
10. U.S. Environmental Protection Agency, *National residential radon survey: Summary report*. 1992.
11. Maine Childhood Lead Poisoning Prevention Program, *Childhood Lead Poisoning in Maine*. 2008, Maine Center for Disease Control and Prevention: Augusta, ME.
12. Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J *Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental Disabilities*. *Environmental Health Perspectives*, 2002. 110(7): p. 721-728.
13. Davis ME, *Economic Assessment of Children's Health and the Environment in Maine*. Maine Policy Review 2010. 19(1): p. 34-45.
14. Centers for Disease Control and Prevention. *Food Safety*. Winnable Battles 2011 [cited 2011 December 16]; Available from: cdc.gov/WinnableBattles/FoodSafety/index.html